UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROBERT WINSTON NOWLIN
and SETH SUPPAPOLA

Appeal 2009-0846
Application 10/645,360
Technology Center 2600

Decided:[1] March 16, 2009

Before KENNETH W. HAIRSTON, MARC S. HOFF,
and KARL D. EASTHOM, *Administrative Patent Judges.*

HAIRSTON, *Administrative Patent Judge.*

DECISION ON APPEAL

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

STATEMENT OF THE CASE

Appellants seek our review under 35 U.S.C. § 134 from the Examiner's final rejection of claims 1 to 10. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

The Invention

Appellants' invention is directed to a cellular telephone and a method for providing a comfort noise signal in the telephone, the telephone having a plurality of sub-band filters, the method including generating a white noise signal and using a QMF filter bank to control the magnitude of white noise in each QMF filter according to the sub-band filtered signal.[2]

Claim 1 is representative of the claims on appeal, and read as follows:

1. A method for providing a comfort noise signal in a telephone having a receive channel and a transmit channel and a plurality of sub-band filters in at least one channel, said method comprising the steps of:

generating a white noise signal;

applying the white noise signal to a QMF filter bank to produce a comfort noise signal, wherein the magnitude of the white noise into each QMF filter is controlled in accordance with the magnitude of the signal in a corresponding sub-band in the one channel; and

selectively coupling the comfort noise signal to at least one of the channels. (Emphasis added).

[2] *See generally* Abstract; Spec. 2; Figs. 3-5; claims 1 and 6.

The Applied Prior Art

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Swaminathan	US 5,630,016	May 13, 1997
Uchino	US 2003/0063662 A1	Apr. 3, 2003

The Rejection

The Examiner rejected claims 1 to 10 under 35 U.S.C. § 103(a) as being unpatentable based on the teachings and suggestions of Swaminathan and Uchino.

ISSUE

Appellants' independent claims 1 and 6 each recite the feature of using a QMF filter bank to filter plural sub-band filtered signals in order to produce a comfort noise signal (hereinafter, "the QMF feature") (*see infra* Finding of Fact 2). Dependent claims 2 to 5 depend from claim 1, and dependent claims 7 to 10 depend from claim 6. Thus, each of claims 1 to 10 on appeal recites the noted QMF feature.

The Examiner rejected claims 1 to 10 over the combination of Swaminathan and Uchino. The Examiner relied upon Swaminathan as showing the basic features of a digital cellular telephone including a comfort noise generator, and relied upon Uchino as teaching (i) a white noise generator, and (ii) a quadrature mirror filter (QMF) bank for filtering multiple frequency sub-bands filtered by multiple sub-band filters where the magnitude of white noise in each QMF is controlled according to the magnitude of the signal in each sub-band (Ans. 3-6).

With regard to the QMF feature of claims 1 to 10 (*see generally* claim 1, emphasized portion, *supra*), the Examiner states:

> ... it would be obvious to one of ordinary skill in the art at the time of the applicant[s'][sic] invention to apply Uchino et al.'s method of generating noise in the telephone of Swaninathan et al. *in order to generate a noise signal that fluctuates along the power spectrum density distribution characteristic of the frequency fluctuations of the receive or transmit channel.*

(Ans. 4 and 6, citing para. 0478 of Uchino) (emphasis added).

Appellants contend that Swaminathan and Uchino are unrelated and that there is no basis for making the combination (Br. 4 and 7). Appellants assert that the references are unrelated because Uchino is directed to testing using a white noise signal, while Swaminathan and Appellants' inventions are directed to digital cellular telephones with comfort noise generators (Br. 4-6).

Accordingly, the issue is: Have Appellants established that the Examiner has not presented a rational basis for combining the digital communication system of Swaminathan with the test signal method and apparatus of Uchino?

Rather than repeat the arguments of Appellants or the Examiner, we refer to the Brief and the Answer for their respective details.[3]

[3] We refer to the Appeal Brief (Br.) filed June 4, 2007, and the Examiner's Answer (Ans.) mailed September 10, 2007, throughout this opinion.

FINDINGS OF FACT

The findings of fact (FF) throughout this decision are supported by a preponderance of the evidence of record. The following facts are pertinent to the issue before us.

Appellants' Disclosure

1. Appellants describe and claim a digital cellular telephone 22 (Fig. 3 and 4) and a method for providing a comfort noise signal in the telephone 22, the telephone 22 having plural sub-band filters 54 (Abstract). The method includes generating a white noise signal and using a QMF filter bank 77 (*see* Fig. 6) to control the magnitude of white noise in each QMF filter 90-99 (*see* Fig. 8) according to the sub-band filtered signal (*see generally* Spec. 2; Figs. 3-8; claim 1).

2. Independent claims 1 and 6 each recite the common limitation of using a QMF filter bank to filter plural sub-band filtered signals in order to produce a comfort noise signal (*see* claims 1 and 6).

3. Appellants disclose that there is a need in the art to use comfort noise in a telephone or other voice communications device to suppress residual echo, while at the same time generate an improved comfort noise that matches actual background noise and has a more natural sound (*i.e.*, avoids apparent loudness changes during conversation) (Spec. 1-2).

4. Appellants' invention produces comfort noise which "more closely matches the spectral content of actual noise during a call," and does this "by shaping white noise in a M channel quadrature mirror filter bank in accordance with the amplitude of the actual noise" (Spec. 10).

Uchino

5. Uchino discloses a method and apparatus 20 for generating a test signal to test the response of a digital line 1 (Fig. 1, 5, 22-24 and 26-28). The test signal is generated with a wander generator 21 based on a random number signal and a clock signal, and is combined with a white noise signal n1-n13 and then filtered by a QMF filter bank 56/57 (Abs.; Fig. 1; para. 0472). Uchino teaches dividing the signal into plural sub-bands in order to perform weighted processing on the signal, and then filtering the signal using the QMF filter bank in accordance with weighting coefficients which determine the spectrum characteristic of the output signal (paras. 0478 and 0490). The weighting coefficients are fixed and are set by the "characteristic information setting means" (para. 0457). The weighting coefficients are set according to testing parameters such as time interval error which accounts for wander and jitter at certain frequencies (paras. 0007, 0008-0014, 0019, and 0025-0027).

6. Uchino fails to teach testing a line during a phone call, during cellular phone operation, or in any type of communication where there is a variable signal such as voice, speech, or conversation. Uchino also fails to teach using a QMF filter bank to process a voice signal in a cellular digital telephone such that the amplitude of white noise is varied in accordance with the amplitude of a variable (*i.e.*, speech) signal.

Swaminathan

7. Swaminathan teaches a digital cellular telephone system (Figs. 1 and 2) and a method for providing a comfort noise signal in the telephone using a comfort noise generator 76 (Abs.; col. 1, ll. 14-19). Swaminathan's comfort noise generator 76 operates to generate a comfort noise which is

based on a spectrally flattened background noise (*see* Fig. 3; col. 5, l. 30 to col. 6, l. 11). Although Swaminathan discloses using an infinite impulse response filter to filter the generated noise, and normalizing delayed samples over time, there is no disclosure of dividing an input signal into plural sub-bands for different processing based on input signal amplitude (*see* col. 3, ll. 41-64). The weighting factors ("a" and "1-a") are not based on frequency bands (col. 3, l. 66 to col. 4, l. 7). Likewise there is no teaching in Swaminathan of using a QMF filter bank to process the spectrally flat background noise signal.

PRINCIPLES OF LAW

"In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness." *In re Rijckaert*, 9 F.3d 1531, 1532 (Fed. Cir. 1993) (citing *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992)).

"'A *prima facie* case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art.'" *In re Bell*, 991 F.2d 781, 783 (Fed. Cir. 1993) (quoting *In re Rinehart*, 531 F.2d 1048, 1051 (CCPA 1976)).

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007) (citation omitted). The Examiner's "articulated reasoning . . .

in the rejection must possess a rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). The Supreme Court, citing *Kahn*, 441 F.3d at 988, stated that "rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR*, 127 S. Ct. at 1741.

When combining references to show non-obviousness under § 103, the Examiner must satisfy a two-prong test for analogous art, as set forth by the Federal Circuit in *In re Kahn*, 441 F.3d 977:

> The analogous-art test requires that the Board show that a reference is either [1] in the field of the applicant's endeavor *or* [2] is reasonably pertinent to the problem with which the inventor was concerned in order to rely on that reference as a basis for rejection. References are selected as being reasonably pertinent to the problem based on the judgment of a person having ordinary skill in the art.

Kahn, 441 F.3d at 986-87 (emphasis added) (internal citations omitted).

Appellants have the burden on appeal to the Board to demonstrate an error in the Examiner's position. *See Kahn,* 441 F.3d at 985-86.

ANALYSIS

Appellants' argument that Uchino is unrelated to the method and apparatus claimed, and thus is non-analogous art (Br. 6), is convincing. The

two-step test for determining whether a reference is analogous art (set forth in *Kahn*, *supra*) is not met.

We agree with Appellants that (1) Uchino is directed to generating a test signal (and is thus unrelated to Appellants' claimed invention) (Br. 5-6), and (2) that Uchino is not reasonably pertinent to the problem faced by Appellants of providing comfort noise in a digital cellular telephone environment while matching actual background noise, the same problem with which Swaminathan was concerned (*see generally* Br. 7-8). *Kahn*, 441 F.3d at 986-87.

Step One of the Two-Step Test

The first step of the two-step test for analogous art set forth in *Kahn* requires that the subject reference (*i.e.*, Uchino) be from the same field of endeavor as Appellants' invention. *Kahn*, 441 F.3d at 986-87.

Appellants' Specification and Swaminathan both disclose digital cellular telephone systems (FF 1 and 7). Appellants' Specification is concerned with generating comfort noise in a digital cellular telephone environment, and more specifically with matching comfort noise to the actual background noise in order to add a little noise during conversation to avoid changes in apparent loudness of speech during a call while making the comfort noise sound more natural (Spec. 1-2). Swaminathan is concerned with generating comfort noise in a digital cellular telephone environment (FF 7), and also is concerned with producing comfort noise that more closely matches the background noise in the call (FF 7). To the contrary, Uchino relates to the testing of a digital line (not during a call) by using a wander generator to generate white noise to test line response in a short measuring

time (*e.g.*, phase noise, wander, jitter, etc.) (paras. 0002, 0003, and 0006; FF 5).

Although the Examiner is correct that Uchino and Swaminathan are both broadly directed to digital communications systems (Ans. 5 and 8), the systems of Appellants' invention and Swaminathan (digital cellular telephone communications system that generate a more natural sounding comfort noise), are divergent from the system of Uchino which generates and filters a white noise for purposes of testing a digital line. Thus, the first step of the two-step test for analogous art set forth in *Kahn*, requiring that the subject reference (*i.e.*, Uchino) be from the same field of endeavor as Appellants' invention, is not met. *Kahn*, 441 F.3d at 986-87.

Step Two of the Two-Step Test

Step two of the two-step test for analogous art set forth in *Kahn* requires that one of ordinary skill in the art consider the subject reference (*i.e.*, Uchino) to be reasonably pertinent to the problem with which the inventor was concerned.

Appellants are correct that Uchino is not reasonably pertinent to the problem faced by Appellants of providing improved and more natural sounding comfort noise in a digital cellular telephone environment (*see* FF 3). Uchino is concerned with generating a *test signal* to test a digital line using filter coefficients based on *fixed* amplitudes (*see* FF 5), and one of ordinary skill in the art faced with the problem of improving comfort noise characteristics would not have been reasonably expected to look to the test signal system and method of Uchino for help with generating a noise signal in a *cellular phone system* that varies in amplitude based on *varying* sub-band signal amplitudes in order to create a more natural comfort noise.

In other words, one of ordinary skill in the art would not have found Uchino's wander generator and test system reasonably pertinent to Appellants' problem of overcoming the disadvantages of noticeable comfort noise on a cellular telephone call, such as in the system and method of Swaminathan (*see generally* FF 2, 3, and 7). *Kahn*, 441 F.3d at 986-87. The ordinarily skilled artisan would not have found a QMF filter bank that generates a test signal which fluctuates along the power spectrum density distribution characteristic useful in overcoming the problem of producing a more natural comfort noise in a digital cellular telephone and speech signal environment encountered by Appellants and/or Swaminathan. Thus, step two of the two-step test for analogous art is not met.

For all of the foregoing reasons, the Examiner erred in determining that Uchino is analogous art and is therefore combinable with Swaminathan.

Appellants aptly state that "the rejection comes down to an assertion that it is obvious to generate comfort noise in the manner that the Uchino et al. publication generates test signals" (Br. 6). One of ordinary skill in the art, looking at Swaminathan's disclosure of a digital cellular telephone apparatus and method for generating comfort noise, which seeks to provide a comfort noise that more closely matches actual background noise (*see* FF 7), would not have found it obvious to follow Uchino's disclosure of generating a test signal to test a digital line using filter coefficients based on fixed amplitudes (*see* FF 5), to produce the result sought by the Appellants of providing an improved comfort noise generator which approximates spectral content of actual noise during a call by shaping white noise with a QMF filter bank according to a variable noise coefficient (*see* FF 1, 3 and 4).

Because Uchino and Appellants' claimed invention (and Swaminathan) are from divergent fields of endeavor and are not concerned with solving similar problems, Uchino is non-analogous art, and it would not have been obvious to combine Uchino with Swaminathan to achieve the claimed invention. Accordingly, the Examiner failed to establish a prima facie case of obviousness with respect to claims 1 to 10. *See Rijckaert*, 9 F.3d at 1532 (internal citations omitted) (stating that "the examiner bears the initial burden of presenting a *prima facie* case of obviousness"). In view of the foregoing, Appellants have shown that the Examiner erred in determining that Swaminathan and Uchino are combinable, and therefore teach or suggest the QMF feature which occurs in independent claims 1 and 6. The same holds true for all of the other dependent claims on appeal because they include the noted QMF feature.

The Examiner's conclusory statement that it would have been obvious to modify Swaminathan with Uchino "*in order to generate a noise signal that fluctuates along the power spectrum density distribution characteristic of the frequency fluctuations of the receive or transmit channel*" (Ans. 4 and 6) (emphasis added), does not constitute "'articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *KSR*, 127 S. Ct. at 1741. The Examiner has not provided a rational basis as to why the ordinarily skilled artisan concerned with comfort noise in a cellular phone environment would have looked to a test signal generator to solve the problem of filtering the comfort noise or making it seem more natural. We agree with Appellants that there is no basis for the combination (*see* Br. 5 and 7). Therefore, the Examiner has failed to provide a prima

facie case of obviousness with respect to claims 1 to 10. *See Oetiker*, 977 F.2d at 1445; *Bell*, 991 F.2d at 783.

Appellants' burden of demonstrating error in the Examiner's position with regard to claims 1 to 10 has been met. *See Kahn,* 441 F.3d at 985-86.

CONCLUSIONS OF LAW

For the foregoing reasons, Appellants have shown that the Examiner has not presented a rational basis for combining the digital communication system of Swaminathan with the test signal method and apparatus of Uchino as required by claims 1 to 10.

ORDER

We reverse the Examiner's obviousness rejections of claims 1 to 10 under § 103(a).

REVERSED

KIS

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KEITH C. HONG, HUSNU M. KALKANOGLU, and
MING L. SHIAO

Appeal 2009-005841
Application 10/600,847
Technology Center 1700

Decided: September 30, 2009

Before CHUNG K. PAK, PETER F. KRATZ, and MARK NAGUMO,
Administrative Patent Judges.

KRATZ, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the Examiner's final rejection of claims 1-9, 23, and 25-34. We have jurisdiction pursuant to 35 U.S.C. § 6. Oral arguments were presented on September 17, 2009.

Appellant's claimed invention is directed to a method of producing algae-resistant roofing granules employing a void-forming material.

Claim 3 is illustrative of the claimed subject matter and is reproduced below:

3. A process for producing algae-resistant roofing granules, the process comprising:

(a) providing inert base particles;

(b) forming first intermediate particles by coating the inert base particles with a first mixture including;

at least one algaecidal material comprising cuprous oxide, and

a void-forming material, the void-forming material releasing gaseous material at temperatures above 90 °C, and having an average particle size no larger than 2mm,

to form first layer on the inert base particles;

(c) forming second intermediate particles by coating the first intermediate particles with a second mixture including a binder and a coloring material and not including a void-forming material; and

(d) heating the second intermediate particles to release the gaseous material and form pores in the first layer to produce the roofing granules.

The Examiner refers to the following prior art evidence[1]:

Skadulis	3,528,842	Sept. 15, 1970
Joedicke	4,378,408	Mar. 29, 1983
Greenberg	3,918,407	Nov. 11, 1975
McMahon	3,507,676	Apr. 21, 1970
Hojaji	4,430,108	Feb. 7, 1984
Adsetts	4,145,400	Mar. 20, 1979

[1] The Examiner acknowledges that Adsetts, Arnold, Herbig, and Smith are not being relied upon (Ans., pp. 8 and 9). Accordingly, we shall not consider these references as being part of the evidence that is relied upon by the Examiner in rejecting the appealed claims, not withstanding the Examiner's further referrals to at least some of this evidence in responding to Appellants' arguments and evidence (Ans. 13-17). *See In re Hoch*, 428 F.2d 1341, 1342 n.3 (CCPA 1970).

Arnold	3,961,628	Jun. 8, 1976
Herbig	5,879,752	Mar. 2, 1999
Smith	5,888,930	Mar. 30, 1999

Claims 3, 4, 7, 11, 16-21, 23, 28-32, and 36-41 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Skadulis in view of Joedicke. Claims 3, 4, 7, 11, 16-21, 23, 28-32, and 36-41 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Skadulis in view of Greenburg. Claims 12, 13, and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Skadulis in view of Joedicke or Greenburg, and McMahon. Claims 14, 15, 34, and 35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Skadulis in view of Joedicke or Greenburg, and Hojaji.

We reverse the stated rejection for reasons set forth in the Appeal Brief and Reply Brief.

The Examiner recognizes that Skadulis does not teach using a void forming material in coating a roofing granule with a coating that includes an algaecide, particularly a void-forming material together with an algaecide and binder in forming a first layer cover for a roofing granule, wherein a second layer coating including a binder and colorant, without a void-forming material, is subsequently applied over the first layer coating, as required by the appealed claims (Ans. 4 and 6).

The Examiner turns to Joedicke or Greenberg for allegedly suggesting a modification of Skadulis - the use of void-forming material in forming an inner coating layer on a roofing granule in the coating method otherwise allegedly taught or suggested by Skadulis by itself (Ans. 4-7).

Appellants contend that Joedicke is concerned with reducing the use of expensive titanium dioxide pigment and uses light scattering void-

forming material to that end, in forming a layer that receives light, that is, a visible layer, as supported by the Declaration of Dr. Hong (App. Br., pp. 4 and 5, Hong Decl., para. 7). Moreover, Appellants assert that the Examiner has not reasonably established that the second coating layer of Skadulis would be expected to be transparent to light, as would be required for one of ordinary skill in the art to even entertain the addition of void-forming material, as taught by Joedicke, to the materials used in forming Skadulis' first coating layer based on the Examiner's asserted theory as to why one of ordinary skill in the art would have combined these teachings from the applied references (see, e.g., App. Br. 4-11).

As for the Examiner's proposed combination of Greenberg and Skadulis, Appellants maintain that Greenberg is directed to controlling the release of flea insecticide from a collar to be worn by an animal, such as a cat or dog, by adding a porosity control agent, which is distinctly differing subject matter that is not analogous to the subject matter of the present invention and that of Skadulis (App. Br. 12-16). Appellants contend that, even if Greenberg was taken as relevant prior art to the present invention, Greenberg would not have suggested a modification to forming the inner coating of the method of covering a roofing granule taught or suggested by Skadulis because Greenberg is concerned with an additive that provides porosity at the surface of a flea collar (App. Br. 16-17).

PRINCIPAL ISSUES

Have Appellants established reversible error in the Examiner's obviousness rejection over Skadulis in view of Joedicke because the Examiner has not reasonably established that Joedicke would have suggested introducing a light scattering gas forming compound as part of an inner coating layer of the roofing granules of Skadulis, which granules of Skadulis

include an outer layer that would have been expected to forestall light transmission into the inner layer, as would have been understood by one of ordinary skill in the art?

Have Appellants established reversible error in the Examiner's obviousness rejection over Skadulis in view of Greenberg because the Examiner has not established that Greenberg, which is directed to a pet flea collar surface porosity control additive for controlling insecticide released to warm blooded animals (e.g., cats and dogs) wearing such a collar for about 90 days, would have suggested introducing a void-forming material as part of an inner coating layer of the roofing granules of Skadulis?

PRINCIPLES OF LAW

It is well settled that the burden of establishing a prima facie case of non-patentability resides with the Patent and Trademark Office (PTO). *See In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984).

A sustainable obviousness rejection must be accompanied by "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (quoted with approval in *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007)).

FINDINGS OF FACT

The Examiner states:

> Skadulis fails to teach that the first layer further contains a void-forming material that release gaseous material at temperatures above 90°C, and have an average particle size no larger than 2mm, which form pores upon firing, and the second layer does not have a void-forming material (Claims 3 and 28).

Skadulis discloses adding a water insoluble compound, such as Cu_2O, to a roofing granule coating mixture, as an algaecide, that is effective for a long period of years (col. 2, ll. 37-52).

Skadulis exemplifies the use of Cu_2O in a second (outer) or first (inner) roofing granule coating mixture, wherein each mixture includes binder (sodium silicate) and kaolin clay (Examples 1 and 3, respectively, col. 4, ll. 11-75, col. 5, ll. 11-40). In Example 1, colorant (TiO_2) is present in the first and second coating compositions and a reddish off-white colored product granule is obtained (col. 4, ll. 11-49). In Example 3, colorant (TiO_2) and cobalt blue stain) is present in the second coating composition and bluish-gray colored granules were obtained (col. 5, ll. 11-36).

Joedicke discloses roofing granule coatings wherein binder, such as sodium silicate, coloring pigment, and a gas forming compound are employed (Abstract).

Joedicke teaches that adding gas-forming compounds, such as hydrogen peroxide, to a coating composition (paint), prior to coating the granule, enhances film opacity via light scattering micro voids formed during film drying, which voids can reduce pigment requirements (col. 2, l. 60- col. 3, l. 5).

Joedicke teaches that titanium dioxide (TiO_2) is a preferred pigment for white coatings (col. 3, ll. 31-36).

Joedicke discloses that:

> Granules may be coated in one or more coats with any desired amount of coating material and gas forming compound may be used in any one or more of the coatings. Gas forming compound is preferably used in the outer coating. . . In a

> particularly preferred embodiment of the invention and in accordance with conventional practice, two separate coatings are preferably used to produce white colored granules with the innermost coating comprising between about 50 and about 70 pounds per ton of granules on a dry basis and containing little or no titanium dioxide and no gas forming compound. The outer coating is preferably used in amounts between about 40 and about 50 pounds per ton of granules on a dry basis and contains TiO_2 and gas forming compound.

(col. 5, ll. 37-51).

Joedicke provides an Example 2 wherein gas forming compound is added to a second coat and not the first coat applied to roofing granules (Example 2, col. 6, l. 52 – col. 7, l. 38). Results presented for the Examples are said to establish that such gas forming compound addition, compared to a control, reduces the amount of titanium dioxide needed for a given level of lightness (Example 2, Table II, col. 7, ll. 18-38).

Greenberg discloses a pet collar made from resins, such as PVC, that includes an insecticide for fleas, such as dimethyl 1,2-dibromo-2,2-dichloroethyl phosphate (naled), and a surface porosity control component that is said to increase surface porosity of the resinous collar so as to release adequate amounts of the insecticide for control of fleas for several months on an animal (e.g., cat or dog) wearing the collar (Abstract, col. 4, l. 59 – col. 6, l. 38).

Greenberg teaches that "[t]he main function of the [surface porosity control] additive is to provide a surface porosity which preferably includes pores extending part way into the body of the collar" (col. 5, ll. 21-23).

Greenberg teaches that the additive component is used in amounts such that the collar "strip releases naled gas at a rate effective to control

fleas throughout a period of at least 90 days without forming droplets on the strip" (col. 5, ll. 48-54).

In a declaration under 37 C.F.R. § 1.132, Dr. Hong, a named co-inventor of the subject application, states, *inter alia*, that:

> 7. With respect to the Examiner's comment in Paragraph 5 of the Examiner's Action that U.S. Patent 4,378,408 ("Joedicke '408") teaches that roofing granules may be coated in multiple coats with any desired amount of coating material and gas-forming compound may be used in any one of multiple coatings to greatly enhance film opacity and afford significant pigment reductions, particularly TiO_2, in whites (referencing column 5, lines: 38-41), in my opinion one of ordinary skill in this art would have a different understanding of Joedicke '408's teaching. In particular, one of ordinary skill in the art would understand that the effectiveness of microvoids created by gas-forming compounds such as sodium perborate in enhancing the opacity of a multiply layer coating would depend on several parameters, including (1) the specific layer in which the microvoids were created, (2) the composition of the microvoid-carrying layer, (3) the existence of one or more layers exterior to the microvoid-carrying layer and their respective compositions. Thus, while the presence of microvoids in an interior layer coated with a clear, pigment-exterior layer could contribute significantly to the opacity of the entire composition, to the extent the exterior layer or layers includes pigments, the contribution to the opacity of the entire coating composition from microvoids present in interior layers becomes correspondingly less significant. The pigmented outer layer or layers mask or hide the inner layer, so that light scattering is diminished or extinguished entirely.
>
> 8. One of ordinary skill the art would also understand that while light colored coating compositions may be improved by the presence of microvoids, similar improvement is not to be expected in the case of dark colored coating compositions, which tend to absorb light rather than reflect light. On the contrary, one of ordinary skill in the art would understand the adding light-scattering microvoids to a coating composition

having a dark color would tend to work against the colored pigment, by lightening the coating, thus requiring more pigment to achieve a desired color, rather than less as in the case of a light-colored coating composition, such as a white coating composition pigmented with titanium dioxide.

ANALYSIS

Rejection over Skadulis and Joedicke

All of the claims on appeal are drawn to a process of producing algae-resistant roofing granules wherein a gas-generating void forming material, together with at least one algaecidal material, are included in a first composition used for coating inert base particles with a first inner layer and wherein such void-forming material is not present in a second outer coating composition used in forming a second coating layer, and wherein pores are formed in the first inner layer due to the release of gas by the void forming material presence upon subjecting the coated particles to heat (see independent claims 3 and 23).

In the first stated rejection, the Examiner relies on Skadulis for disclosing a process of coating roofing granules with more than one layer of alkali metal silicate-clay coating composition, wherein the coating composition for the inner or outer layer includes an algaecidal material (Cu_2O), as generally indicated above and as set forth by the Examiner in the Answer (Ans. 3-4). The Examiner expresses the rejection position noting that Skadulis does not disclose employing void-forming material, as Appellants' claimed process requires (Ans. 4). As the Examiner notes, Skadulis presents an Example I wherein pigment (titanium dioxide) is added to first and second layers, and Cu_2O to the second (outer) layer and an

Example III wherein color pigment (titanium dioxide) forms part of the second (outer) later coating composition and Cu_2O is added as part of the first coating layer composition (Ans. 5). In Example III, Skadulis includes cobalt blue stain in the coating composition for the outer (second) layer (col. 5, l. 29).

While Joedicke notes that roofing granules can be subjected to coating using one or multiple coats using any desired amount of coating material and wherein gas forming compound may be used in any one or more of the coatings as urged by the Examiner, Joedicke also teaches that the gas forming compound is employed to reduce pigment requirements by forming light scattering micro-voids (Ans. 5). In other words, Joedicke, when read in appropriate context, suggests that the gas forming compounds work as pigment reducing compounds only if an effective amount of light reaches the voids formed in any layers containing same such that the light could be scattered.

Thus, Appellants reasonably assert that the Examiner assumes too much from the teachings of Joedicke and Skadulis by asserting that one of ordinary skill in the art would have been led to add "inexpensive gas forming compounds [of Joedicke] to the first layer [composition] of Skadulis containing a TiO_2 pigment with the expectation of providing the desired light color at significant TiO_2 pigment reduction" (Ans. 5). This is basically because the Examiner has not reasonably established that one of ordinary skill in the art would have expected that any significant light would have reached the first (inner)layer of Skadulis for the gas forming compounds to be of any benefit if added only to the inner first layer of the Example I method of Skadulis given that the second layer of Skadulis' Example I includes a significant amount of titanium dioxide in addition to Cu_2O, clay

and sodium silicate binder applied thereto, as urged by Appellants (App. Br. 4-10; Reply Br. 1-6; Hong Decl., para. 7). We agree with Appellants.

On this record, we reverse the Examiner's obviousness rejection of claims 3, 4, 7, 11, 16-21, 23, 28-32, and 36-41 over Skadulis and Joedicke.

Rejection over Skadulis and Greenberg

As for the Examiner's proposed combination of Greenberg with Skadulis, the Examiner maintains that:

> It would have been obvious ... to have incorporated particles of heat decomposable gas forming compound to a coating composition of a *toxicant containing first layer* in Skadulis with the expectation of providing the desired release rate by controlling texture and porosity of the layer with the use of particles of gas forming heat decomposable compound, as taught by Greenberg.

(Ans. 6-7)

Even if we agreed, *arguendo*, with the Examiner that Greenberg represents analogous art to the extent that Greenberg is concerned with controlling the release of a component that reduces the growth of or eliminates an organism at a location that the organism is not desired to be located on, the Examiner has not reasonably explained how the teachings of Greenberg with respect to incorporating an additive in a flea collar for providing pores extending from a surface thereof for releasing a particular insecticide gas would have suggested, to one of ordinary skill in the roofing granule formation art, the addition of a gas forming component to only an inner coating layer of the roofing granules of Skadulis for forming pores in the interior layer, much less a component that would have been effective for controlling the release of an algaecidal material, such as cuprous oxide, from such an interior location, as urged by Appellants (App. Br. 16-17).

On this record, we reverse the Examiner's obviousness rejection of claims 3, 4, 7, 11, 16-21, 23, 28-32, and 36-41as being unpatentable over Skadulis in view of Greenburg.

Additional Rejections

As for the Examiner's separate rejections additionally applying McMahon to dependent claims 12, 13, and 33 and Hojaji to dependent claims 14, 15, 34, and 35, we note that the Examiner relies on these additional references for features of the dependent claims and does not further explain how either of these added references would have rendered the subject matter required by the independent claims 3 or 23 obvious, within the meaning of 35 U.S.C. § 103(a). Accordingly, on this record, we shall also reverse the Examiner's obviousness rejections of these dependent claims.

CONCLUSION

Appellants have established reversible error in the Examiner's obviousness rejection over Skadulis in view of Joedicke by asserting that the Examiner has not reasonably established that Joedicke would have suggested introducing a light scattering gas forming compound only as part of an inner coating layer of the roofing granules of Skadulis, without furnishing persuasive evidence establishing that the outer layer coating of Skadulis would not have been expected to forestall light transmission into the inner layer.

Appellants have established reversible error in the Examiner's obviousness rejection over Skadulis in view of Greenberg in asserting that the Examiner has not shown that Greenberg's teachings concerning a pet

flea collar surface porosity control additive used for controlling insecticide released to warm blooded animals (e.g., cats and dogs) wearing such a collar for about 90 days, would have suggested adding such a surface porosity forming material as part of only an inner coating layer of the roofing granules of Skadulis for algaecide release purposes.

ORDER

The Examiner's decision to reject the appealed claims on the grounds of record is reversed.

REVERSED

tc

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte H. GARRETT WADA, and MATTHEW B. MURPHY

Appeal 2007-3733
Application 10/613,220
Technology Center 1600

Decided: January 14, 2008

Before DEMETRA J. MILLS, ERIC GRIMES, and FRANCISCO PRATS, *Administrative Patent Judges*.

PRATS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a system for detecting a component of interest in a biological sample. The Examiner has rejected the claims as obvious. We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

STATEMENT OF THE CASE

THE INVENTION

Detecting a DNA molecule or protein of interest in a biological sample is "of fundamental value in, e.g., diagnostic medicine, archaeology,

anthropology and modern criminal investigation" (Spec. 1). Thus, the Specification discloses "devices, systems, and kits for detecting a component of interest in a complex mixture" (*id.* at 2).

Claims 1-23 are pending and on appeal (App. Br. 2).[1] Claim 1 is representative and reads as follows:

> 1. A system for detecting a component of interest in a sample, the system comprising:
>
> (i) a microfluidic device comprising:
>
> (a) a first microscale channel comprising a gel filled component separation region;
>
> (b) a second microscale channel downstream from the first channel that is fluidly coupled to the first channel, the second channel configured to contain a particle set therein;
>
> (c) a binding region fluidly coupled to or within the first channel;
>
> (d) a source of a component-binding moiety fluidly coupled to the binding region which is capable of binding to the component of interest;
>
> (e) a first detection region within the first channel; and
>
> (f) a second detection region within the second channel which includes a particle stacking region within the second detection region;
>
> (ii) a fluid direction system fluidly coupled to the microfluidic device, which fluid direction system is configured to transport the sample through at least the first and second microscale channels;
>
> (iii) a control system operably linked to the fluid direction system, which control system is configured to instruct the fluid direction system to deliver or transport the sample through at least the first and second microscale channels; and

[1] Appeal Brief filed February 8, 2007.

(iv) a detection system which is configured to be positioned proximal to the first and second detection regions.

THE REJECTION

The Examiner applies the following documents in rejecting the claims:

Nelson	US 6,007,690	Dec. 28, 1999
Spence	US 6,540,895 B1	Apr. 1, 2003

The following rejection is before us for review:

Claims 1-23 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Nelson and Spence. (Ans. 3-5).

ISSUE

The Examiner cites Nelson as disclosing "microfluidic devices comprising several alternative embodiments" (Ans. 3). The Examiner contends that several of Nelson's embodiments meet most of the limitations recited in claim 1 for the microfluidic device (*see id.* at 3-4).

The Examiner concedes that Nelson "does not particularly point out a control system linked to the fluid direction system" (*id.* at 4). Pointing out that Spence "teaches cell sorting utilizing microfluidic systems controlled by a computer or microprocessor that control fluid flow," the Examiner contends that one of ordinary skill would have considered it obvious "to modify the teachings of Nelson et al to include a control system to instruct fluid direction as taught by Spence et al because procedures can be programmed using any suitable software that can perform a variety of functions" (*id.* at 5 (citing Spence, col. 15, ll. 5-27)).

Appellants contend that neither of the cited references discloses or suggests all of the limitations in claim 1 (App. Br. 5). Specifically,

Appellants argue that they "are unable to identify any structure taught by Nelson that corresponds to Applicants' claimed 'source of a component-binding moiety fluidly coupled to the binding region'" (Reply Br. 5). Appellants further contend that "Spence is silent with regard to a channel comprising a gel filled component separation region and so cannot teach a source of a component-binding moiety fluidly coupled to a binding region that is fluidly coupled to or within such a channel" (*id.* at 5-6).

The issue with respect to this rejection, therefore, is whether the Examiner has shown that a device having the configuration of features recited in claim 1, including the "source of a component-binding moiety fluidly coupled to the binding region," would have been obvious to one of ordinary skill in the art.

FINDINGS OF FACT

1. Claim 1 recites a system having the following components:

(i) a microfluidic device having a specified arrangement of two channels and several regions;

(ii) a fluid direction system fluidly coupled to the microfluidic device, the fluid direction system being configured to transport a fluid sample through the two channels;

(iii) a control system operably linked to the fluid direction system, the control system being configured to instruct the fluid direction system to transport the sample through the two channels; and

(iv) a detection system configured to be positioned proximal to first and second detection regions in the microfluidic device.

2. Claim 1 requires the microfluidic device component to have:

(a) a first microscale channel having a gel-filled region for separating components within a sample;

(b) a second microscale channel downstream from the first channel, the second channel being fluidly coupled to the first channel and also configured to contain a particle set;

(c) a binding region which is fluidly coupled to the first channel, or which is within the first channel;

(d) a source of a component-binding moiety fluidly coupled to the binding region, the component-binding moiety being capable of binding to a component of interest;

(e) a first detection region within the first channel; and

(f) a second detection region within the second channel, the second detection region including a particle stacking region.

3. Because the "source of a component-binding moiety . . . capable of binding to the component of interest" must be "fluidly coupled to the binding region," we interpret claim 1 as requiring the "source" to be a separate structure from the binding region. This interpretation is consistent with the Specification, which discloses a particle well 112, fluidly coupled to binding channel 110 (Spec. 12; *see also* Figure 1). The Specification discloses that the "particle set is released from particle well 112 into binding channel 110. The particle set with the components [of interest] attached or adsorbed onto the particle member types is then directed to detection region 114, where the particle member types of the particle set are optionally stacked" (Spec. 12; *see also* Figure 1).

4. Nelson describes microfluidic devices useful in separating and detecting compounds of interest in a number of applications, including "high throughput screening, for genomics and pharmaceutical applications such as gene discovery, drug discovery and development, and clinical development; for point-of-care in vitro diagnostics; for molecular genetic analysis and nucleic acid diagnostics; for cell separations including cell isolation and capture; and for bioresearch generally" (Nelson, col. 2, ll. 61-67). Nelson's devices comprise "at least an enrichment channel and a main electrophoretic flowpath . . . . The enrichment channel serves to enrich a particular fraction of a liquid sample for subsequent movement through the main electrophoretic flowpath" (Nelson, col. 2, ll. 48-53).

5. Nelson discloses a number of elements that correspond to claim 1's "component-binding moiety." Specifically, Nelson discloses that the enrichment channel can contain component-binding materials such as affinity adsorbents, metal chelating agents, Protein G, or antibodies, which can be bound to matrices of insoluble particles, or be membrane-bound (*see* Nelson, col. 5, l. 12, through col. 6, l. 53). Nelson discloses an example in which antibody-coated magnetic beads are used to bind to desired targets in the enrichment zone (*id.* at col. 21, l. 13, through col. 22, l. 13 (Example 2)). Nelson also exemplifies using magnetic beads to bind DNA in the enrichment zone (*id.* at col. 22, l. 15, through col. 23, l. 54 (Example 3)).

6. Nelson also discloses that, in certain embodiments, "affinity zones" can be placed in the main electrophoretic path to capture components of interest (Nelson, col. 17, ll. 9-33; col. 18, ll. 28-32; *see also* Figures 16 and 18). The affinity zones may contain the DNA-specific or protein-specific binding moieties similar to those used in the enrichment channel (*id.* at col.

17, ll. 33-47). Nelson does not disclose a separate reservoir or "source" for the component-binding moieties in either the enrichment channel or the main electrophoretic flowpath.

PRINCIPLES OF LAW

> As stated in *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992):
>
> [T]he examiner bears the initial burden . . . of presenting a *prima facie* case of unpatentability. . . . After evidence or argument is submitted by the applicant in response, patentability is determined on the totality of the record, by a preponderance of evidence with due consideration to persuasiveness of argument.

When determining whether a claim is obvious, an examiner must make "a searching comparison of the claimed invention – *including all its limitations* – with the teaching of the prior art." *In re Ochiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995) (emphasis added). Thus, "obviousness requires a suggestion of all limitations in a claim." *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003) (citing *In re Royka*, 490 F.2d 981, 985 (CCPA 1974)). Moreover, as the Supreme Court recently stated, "*there must be some articulated reasoning* with some rational underpinning to support the legal conclusion of obviousness." *KSR Int'l v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (emphasis added)).

ANALYSIS

We agree with Appellants that the Examiner has not explained where or why the cited references disclose or suggest a microfluidic device having a "source" for the component-binding moieties, wherein the source is separate from a binding region fluidly coupled to or within the first channel.

We note, as pointed out by the Examiner, that Nelson discloses the use of particle-borne component-binding moieties in different parts of its various microfluidic devices (*see* Findings of Fact 6 and 7, above).

However, Nelson's component-binding moieties are intended to remain in either the enrichment zone or affinity zones, with the component of interest being eluted therefrom (*see, e.g.,* Nelson at col. 21, l. 13, through col. 22, l. 13 (Example 2); col. 22, l. 15, through col. 23, l. 54 (Example 3)). Thus, since Nelson's component-binding moieties do not appear to move from their designated zones within the device, we see no apparent specific reason why a person of ordinary skill would have given Nelson's device a separate source of material to replenish the component-binding moieties. Moreover, we do not see any clearly articulated reasoning from the Examiner explaining why one of ordinary skill viewing the cited references would have considered it obvious for Nelson's device to contain a separate source, or reservoir, for the component-binding moieties.

It is well settled that the "Patent and Trademark Office (PTO) must consider all claim limitations when determining patentability of an invention over the prior art." *In re Lowry*, 32 F.3d 1579, 1582 (Fed. Cir. 1994). Because the Examiner has not explained why every limitation in claim 1 would have been obvious to a person of ordinary skill in the art, we agree with Appellants that the Examiner has not made out a case of prima facie obviousness. We therefore reverse the Examiner's obviousness rejection of claims 1-23.

REVERSED

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